

# Chapter 11

## Site Rehabilitation and Stabilization

**Chapter 11 Layout:**  
**Part 1 - Page 131**  
**Planning Site Rehab**

**Part 2 - Page 132**  
**Controlling Runoff and**  
**Capturing Sediment**

**Part 3 - Page 133**  
**Rehab for Crossings**

**Part 4 - Page 134**  
**Controlling Access**

**Part 5 - Page 135**  
**Stabilization**  
-- -- --

Site rehabilitation (site rehab) includes those actions needed when closing out a job site, or portion of that job site, to promote the continued protection of water quality from accelerated runoff after the forestry operation is concluded.

Stabilization is only one part of overall site rehab, and usually refers to the application of groundcover, such as erosion matting and/or vegetation seeding.

### Water Quality Link

Effective site rehab and stabilization will improve water absorption into the soil and help capture sediment, both of which minimize runoff. By reducing runoff, you protect water quality from potential pollution sources.

Allowing a site to naturally heal over usually is not enough on critical areas that may be prone to accelerated erosion, or on sites near waterbodies. That is why site rehab is needed, and required, by the FPGs.

### **FPG**

FPG .0203 and .0209 are the two primary rules in the FPGs that deal with stabilization and/or rehabilitation.

### **Rules Related to Site Rehabilitation and Stabilization**

#### **Forest Practices Guidelines Related to Water Quality (FPGs)**

#### **North Carolina General Statute 77-13 and General Statute 77-14**

#### **DWR riverbasin and watershed 'Riparian Buffer Rules'**

These describe situations within the buffer zone that require stabilization and/or site rehabilitation. Refer to the specific rules for your site.

#### **For Forest Owners:**

*Your long-term goals can influence the rehab and stabilization work done on your property.*

*Examples of questions to think about include:*

- Are roads permanent or temporary?
- Are stream crossings needed after the job is complete?
- Is there a problem with trespassing?
- Do you want to attract wildlife to your land?

Runoff after precipitation may wash sediment and other pollutants to nearby waterbodies at any time during a forestry operation. Because of this, it is important to consider site rehab and stabilization before, during and after forestry activities.

- For example, if a portion of a harvest site is completed and no other activities will be conducted on that portion, site rehab can be accomplished right away, instead of waiting until the end of the harvest job.

The most common places on a job site that need rehab work include roads, skid trails, decks, firelines and stream crossings. However, there may be other places on your job site that need rehab.

## **Part 1 -- Planning Site Rehab**

**Helpful Hints:**

Selecting an appropriate plant / seed to use is important to avoid the introduction of a nuisance plant that could inhibit the growth of native vegetation. Examples of pest plants include:

- Japanese wisteria and honeysuckle
- Japanese stilt-grass ('microstigium')
- Sericea Lespedeza
- Some fescue and rye grasses

**Also Refer To...**

Parts 1 and 2 of Chapter 5 to learn about these BMP tools.

**Also Refer To...**

Chapter 8 for additional BMPs on waste management.

**BMPs for Planning Site Rehab**

- Consider actions that may be necessary to stabilize and rehabilitate the site during and following the forestry operation. Implement these actions as soon as needed. Preharvest planning can help you with this. More information on planning is in Chapter 3.
- Understand the soil conditions so you will know which type of vegetation is appropriate, and how much (if any) soil additive will be needed:
  - Consider having a soil test or foliar test done. Other sources of soils information include soil surveys, local knowledge or resource professionals with the USDA-NRCS, state Soil & Water Conservation District, or Cooperative Extension Service, among others.
- Evaluate which vegetation or plant seed will be appropriate for the job site. Knowing the landowner's objectives for the site may help you with this, but is not required in all cases.

**Part 2 -- Controlling Runoff and Capturing Sediment**

Part of site rehab includes installing BMP tools that control runoff and/or capture sediment.

**BMPs to Control Runoff and Capture Sediment**

- Use appropriate methods to control and/or capture runoff or sediment from entering into a waterbody. As a reminder, this may include:
  - Broad-based dips, waterbars, turnouts, inside ditchlines, cross-drains, filter areas, sediment traps or pits, silt fences, hay bales, brush barriers, check dams or insloping, outsloping and crowning of roads.
- Consider placing logging debris such as slash, laps or limbs on critical bare soil areas as the forestry operation is ongoing. This material can help control runoff during and after the job:
  - With each pass of the equipment, the logging debris is packed onto the soil surface, creating a mat of debris that intercepts precipitation and protects the soil surface from intensive soil disturbance by repeated equipment traffic.
- Remove waste and trash from the job site:
  - Leftover materials can become a water quality pollution risk if they remain on site and are then washed into waterbodies by runoff.
  - Do not bury or burn leftover waste on the site. Remove the waste products for appropriate disposal or recycling.

**Caption:**

*This skid trail has debris packed down atop its running surface.*

*This debris acts like a cushion and protects the soil, while also filtering runoff.*

*If you use this method of stabilization, you need to pack down debris from the very beginning, rather than waiting until the end of the job to lay down the debris.*

**Figure 11A: Skid trail with logging debris packed down on the trail**



### **Part 3 -- Rehab for Stream Crossings**

Stream crossings should receive special attention during site rehab. This is due to the potential for direct flow of nonpoint source pollution from the job site into the water at the stream crossing.

#### **BMPs for Stream Crossing Rehab**

- Remove debris from the stream channel to avoid violations of the nine FPG standards as well as the N.C. General Statutes §77-13 and §77-14.
- Remove the stream crossing itself, if appropriate for the landowner's goals:
  - This should include all fill material used for culvert installations.
  - If all material cannot be removed, take action to insure this loose material does not enter the stream.
- Re-contour the streambank edges and approachways if needed to resemble their natural condition before disturbance:
  - Minimize the potential for runoff to flow into the stream at the crossing.
  - Reshaping may also promote successful groundcover establishment and/or growth.
- Use appropriate BMP tools to divert, control and/or capture runoff or sediment from entering the stream along the approachways to the crossing.

**FPG**

**Figure 11B: A stream crossing that needs rehabilitation work**

**Caption:**

*This stream crossing is shown before rehab (above) and after (below).*

*Note the BMP/rehab work that was done:*

*- Logging debris removed from stream channel.*

*- Soil ruts eliminated at the crossing location.*

*- Streambanks and approachways seeded and mulched with fresh 'green up' of grasses.*

*- Additional brush barrier material piled near the crossing, on the opposite side of the stream.*

***Before removing and rehabilitating a stream crossing, be sure all of your work is completed on the 'other side' of the stream, because you do not want to cross back over once it is stabilized!***



**Figure 11C: Same stream crossing after rehab work is completed**



## **Part 4 -- Controlling Access**

Controlling access to forest roads, firelines, and skid trails results in more effective site stabilization which leads to clean water, improved property control, attractive aesthetics and enhanced wildlife habitat.

Part of access control includes monitoring and maintaining the site after the activity is complete. Monitoring the site will let you know if your BMP and rehab work has been altered or is no longer functioning the way it should.

### For Forest Owners:

*Prohibiting vehicles, ATVs, livestock, or intensive use of recently stabilized areas is important to promote the establishment of groundcover that can protect water quality for the long-term.*

*Don't forget to check at any unauthorized entry points such as utility and railroad corridors or along public road fronts.*

### FPG

**FPG .0203 and .0209 are the two primary rules in the FPGs that deal with stabilization and/or rehabilitation.**

### Helpful Hints:

*Lime is strongly encouraged for most of North Carolina's soils, which are naturally too acidic for a quick 'green-up' of ground vegetation.*

*Factors to consider when selecting grass or vegetation seed type include:*

- Season, weather.
- Soil type.
- Soil acidity (pH).
- Landowner objectives.
- Soil moisture.
- Plant characteristics.
- Cost.

### BMPs for Controlling Access

- If a road or trail will no longer be needed, consider placing gates, fences or other barriers to keep out unnecessary traffic until the site stabilizes.
  - Monitor the site or work with individuals in the area to monitor and inform you of unexpected activity on the site.
- Periodically monitor the BMP work and other potentially critical areas on the job site to see if erosion is being controlled as intended. Promptly make improvements or use corrective measures, as needed.
  - Monitoring is especially helpful soon after heavy precipitation.
- In some cases, water diversion structures can be used as a deterrent to trespassing along a road or trail. Examples include waterbars, hay bales, brush piles, sediment traps or silt fences.

## Part 5 -- Stabilization

Stabilization is the most vital part of closing out a job site.

Successful stabilization often requires the application of some form of groundcover that will help:

- Soften the impact of raindrops and their erosion energy.
- Reduce the amount and speed of water runoff.
- Re-vegetate exposed critical soil areas that pose a risk to water quality.
- Add organic matter to the soil, which improves water infiltration.

Achieving successful stabilization usually involves some combination of:

- Preparing the soil, which could include adding fertilizer and/or lime.
- Seeding of vegetation.
- Establishing groundcover or mulch.

### BMPs for Preparing the Soil

- Where needed to promote vegetation establishment, limit disking or tilling to those areas that exhibit surface hardening, intensive soil disturbance or may be prone to accelerated runoff that can flow into a stream or waterbody:
  - Doing so will allow better water absorption and reduce runoff.
  - Disking also provides a better rooting zone for the vegetation roots.
- If soil additives such as fertilizer, lime, or organic matter are needed, adding them at the time of disking or tilling will incorporate them into the subsurface soil.
  - This will improve the chances that the additives will not be wasted or wash away from the soil surface.

### **BMPs for Seeding of Vegetation**

- Use seed or mixtures adapted for the site and soil conditions:
  - Refer to the suggested seeding options provided in Table 11-1.
  - Avoid the use of plants that historically have shown to become pests in a forest environment. These plants typically have little or no ecological value and in some cases can hinder long-term forest management.
- Spread seed evenly across the selected area during a time when adequate soil moisture and site conditions allow successful germination and growth:
  - If conditions do not allow, use temporary measures, such as mulch until seed and/or vegetation can successfully establish on the site.

### **BMPs for Mulch or Groundcover**

- Apply mulch cover over seeded areas if needed to help seed germination, plant survival and to protect the seed from being washed away:
  - Spread the mulch to cover approximately 50 to 75 percent of the seeded area or as needed according to the site conditions.
  - Spread the mulch at a rate of about 100 pounds per 1,000 square feet
- Wood bark or wood chip mulch can sometimes also be used, either by itself as temporary groundcover, or as mulch ovetop seeded areas:
  - If used for temporary groundcover, spread the material several inches thick completely across the surface. Netting may be needed to secure the material in place.
  - If used over a seeded area, cover approximately 50 to 75 percent of the seeded area or as needed according to the site conditions. Spread the material at a rate of about 250 pounds per 1,000 square feet.
- Erosion control matting, or ECM, may be a useful tool for permanent stabilization:
  - Follow the seller's or manufacturer's instructions for installing.
  - ECM can be very effective to stabilize side/cut banks and slopes.

#### **Helpful Hints:**

*Consider using straw for mulch instead of hay, since it is easier to apply and less likely to have noxious weed seeds.*

#### **Did You Know?**

*Other names for ECM:  
- Coir mat  
- Jute mat  
- Excelsior mat  
- Erosion blanket*

#### **Caption:**

*This erosion control mat is installed within a turnout outlet.*

*The mat allows rainfall to soak into the soil, and provides a seedbed for vegetation to permanently establish.*

**Figure 11D: Erosion control mat installed for groundcover**



**Helpful Hints:**

- More information is available from (alphabetically):
- Consulting or Registered Foresters.
  - Forest industry cooperative programs.
  - N.C. Cooperative Extension Service.
  - N.C. Forest Service.
  - N.C. Wildlife Resources Commission.
  - N.C. Soil & Water Conservation District.
  - USDA-NRCS.

Table 11-1 describes seeding options that can provide stabilization for the purposes of water quality protection on forestry sites. These seeding options have been field-tested and were selected because they are:

- Relatively low-cost.
- Readily available at many farm or garden supply centers.
- Easy to apply and handle.
- Visually pleasing.
- Adaptable to a wide range of soil conditions.
- Multi-functional and effective for stabilization while still allowing native plants and grasses to naturally revegetate in subsequent growing seasons.

Creeping Red Fescue is a critical component in these mixes. This grass is fairly tolerant of deer browse and provides non-invasive perennial grass cover, even on sites with active browse. Grains such as oats, wheat or rye provide quick green-up cover for site stabilization.

**Table 11-1: Seeding Options for North Carolina Forestry Operations  
Spring Application Mix**

<p><b>Generic soil additive amounts for all seasons:</b></p> <p><b>Fertilizer:</b> 400 pounds per acre with 10-10-10.</p> <p><b>Lime:</b> 2,000 pounds per acre with ground 'agricultural' lime.</p> <p><b>Conversions:</b> Pounds (#) of fertilizer that provide 1.0# of nitrogen per 1,000 sq.ft.:</p> <p>20# of 5-5-5. 20# of 5-10-5. 20# of 5-10-10. 10# of 10-10-10. 12.5# of 8-8-8. 6.25# of 16-0-0.</p>	Creeping Red Fescue	20 pounds / acre	
	Red Clover	10 pounds / acre	
	Oats	1 to 2 bags / acre	
	<b>Summer Application for Temporary Cover</b>		
	German Foxtail or Browntop Millet	25 pounds / acre	
	<b>Early Fall Application Mix</b>		
	Creeping Red Fescue	20 pounds / acre	
	Red Clover	10 pounds / acre	
	Wheat	1 to 2 bags / acre	
	<b>Late Fall Application Mix</b>		
	Creeping Red Fescue	20 pounds / acre	
	Annual Ryegrass	10 pounds / acre	
	Rye	1 to 2 bags / acre	
	<b>Winter Application for Temporary Cover</b>		
	Annual Ryegrass	20 pounds / acre	

**Grain Application Notes:**

- Grains are often sold by weight in pounds, or by volume in bushels:
  - Wheat may be sold in 50-pound bags, or 1-bushel bags that weigh about 60 pounds.
  - Rye is usually sold in 1-bushel bags that contain about 55 pounds.
  - 'Certified' seed oats are sold in 2-bushel bags that contain about 65 pounds.
  - Whole feed oats are sold in 50-pound bags. Feed oats are lower cost than certified seed oats, and can be used with the **Spring Application Mix**.
  - Oats are not as cold-tolerant as wheat and rye, and they may die in the winter at high elevations if used in the **Fall Application Mix**.
  - If the grain in the suggested application mix in Table 11-1 is not available, another should be substituted.
- For seeding with grains, a single bag (between 50 to 60 pounds) should be adequate for most sites. However, if slope or soil conditions warrant, increase the amount of grains to two bags (between 100 to 120 pounds).